the systems, pay TV emphasis in a smaller "classic" system and "good all around marketing" in the fourth.

Although revenue per subscriber was projected to increase an average of $1/year, part of that increase would come from selling additional products. The major sources of projected increased revenues, which would justify the purchase, were an increase in penetration from 42% in year 1 to 61% in year 7, as well as an increase in new homes passed from 206,000 to 260,000.

The combination worked. By improving the systems' signal quality, expanding channel capacity, adding new programming, investing in customer service through new billing and phone systems, and budgeting heavily in marketing (10% to 12% of revenue, shown at venture analysis, page 2) the system gained subscribers and revenue increased, justifying the investment.

The following chart outlines the initial assumptions for year 1 (1986) and year 7 (1992) shown in the venture analysis and compares them with actual year end numbers for 1992.

	Projected 1986	Projected 1992	Actual 12/92
Homes Passed	215,330	260,286	282,439
Subscribers	93,514	158,260	163,957
Basic Penetration	47%	61%	58%
Pay TV Subscribers	82,319	157,357	133,335

Because the acquired McClatchy systems clustered well with Continental's existing Northern California systems, further improvements were justified. Over time, the larger geographic reach enabled Continental to embark on an aggressive program of fiber deployment, plant rebuilds (from 19 to 50 channels), and the installation of addressable converters. Continental also invested significantly in human resources. Employees were added to improve customer response time and permit extended service hours. With clustering, the Northern California region became large enough to support its own regional training center which helped to develop employees and improve customer service.

The "acquisition premium" of $45 million and the high early year marketing costs proved to be reasonable investments which benefited customers. The acquisition premium also, as in Brockton, reflected early years operating losses and deferred returns for the seller, McClatchy Newspapers.

Exhibit F

Appendix 3

Analysis of the FCC's Cable TV Productivity Offset Proposal

David J. Roddy[1]

Introduction

The Commission seeks comments on its proposal (at paragraph 85 of the Notice) to create a formula for annual price adjustments equal to the rate of change of the Gross National Product Price Index (the GNP-PI) *minus* the rate of change of 'productivity' in the cable industry. This has a potentially major financial impact and it is a separate issue from the benchmark model and the cost of service approach. The benchmark and cost of service mechanism lead, according to the FCC, to initial rates. After that point, the percent rate change would be equal to the percent change in GNP-PI minus the productivity offset. As an example, the GNP-PI for the current annual period is about 3.3 %. Suppose that the FCC adopts a productivity offset of 3.3 % as its suggests in option (3) of paragraph 85. In that case, each cable operator's price increase would be the GNP-PI increase of 3.3% minus the productivity offset of 3.3%. This would give a 0% allowed price change, no matter how much the cable operator's costs of doing business had increased.

A "productivity offset" for cable companies cannot be substantiated at this time for both empirical and theoretical reasons. Standard economic analysis shows clearly that the FCC's productivity offset concept is incorrectly applied to the cable industry for several reasons. The cable industry's cost per channel per subscriber[2] is subject to economies that either (a) are one-time in nature and thus cannot be expected to reoccur as the industry matures and/or (b) vary greatly among different operators and regions of the country. Factors that would have to be accounted for include economies of network density, economies of scale, economies of channel capacity, and other economic and financial characteristics. It is impossible for the Commission to successfully develop one (or even several) productivity offsets, because accurate and reliable data to calculate a cable industry productivity growth rate is not available to the Commission. Economists agree on the correct framework for the modern measurement of total factor productivity ("TFP") and a variety of sophisticated and

---

1. Vice President and Senior Economist, Economics and Technology, Inc., One Washington Mall, Boston, Massachusetts 02108, Ph.D., Economics, University of Wisconsin, Madison.

2. Since productivity is directly related to the cost per channel, we can examine the Commission's proposal by discussing factors which influence the cost of producing cable TV services. A more direct measurement of productivity is discussed in Appendix 3.

accurate studies have been conducted in several industries.[3] The required data is just not available in the Cable TV industry.

The productivity offset applied by the Commission in telecommunications provides no guidance or support for such a program applied to the cable industry. The LEC price caps plan for these telecommunications carriers was premised on the assumption that some productivity offset could be broadly defined so as to apply to all of the large, or "Tier I" carriers. This assumption was not, of course, subjected to testing, because the Commission lacked the necessary carrier-specific data to do so. Finally, even if all of the other problems did not exist, the limited data that are available demonstrate that the cable industry's approximate "labor productivity' trend for the last 11 years is essentially zero. In other words, cable operators have been adding employees at a rate comparable to the increase in cable subscribers.[4] Thus, even if the Commission were to adopt the productivity offset concept, the available data indicate that the correct value would be zero.

Discussion

Productivity measures the relationship of outputs and inputs. Outputs are the goods and services that the companies sell to the public. Inputs are the resources that the companies use to produce the outputs. Typically, inputs are categorized as capital, labor, and materials. In this context, productivity is the increase in output which is accomplished without increasing the inputs. In the same spirit, it can be measured as the reduction in the inputs that can be accomplished without decreasing output. Overall, the general approach can be discussed with reference to costs; if productivity is increasing, costs should decrease. The modern approach to productivity measurement focuses on Total Factor Productivity ("TFP") because it is the most accurate and reliable. This approach includes all inputs in its formulation and is regarded as an advance over simpler measures such as labor productivity which uses only one of the inputs.

Thus, as a practical matter, the productivity gains available to a given cable operator can be summarized as the output growth rate (for example, the number of subscribers) *minus* the input growth rate (a measure of the labor, capital plant, and purchased materials). If a

---

3. See, for example, Duke, J., D. Litz, and L. Usher, "Multifactor Productivity in Railroad Transportation", *Monthly Labor Review*, August, 1992, 49-58. The required data items include annual data for at least the last 8 years on measures of the economic concept of the capital stock, the number of employees, and purchases of materials and intermediate services. An accurate measure of the capital stock, for example, includes inflation adjusted values for past investment by asset category by year including economically correct depreciation rates, tax rates, and tax depreciation rates as well as an overall correct industry rate of return. See, for example, Hulten, C. "The Measurement of Capital", in E. Berndt and J. Triplett, eds., *Fifty Years of Economic Measurement*, Chicago: University of Chicago Press, 1990.

4. This is true even though, as the Commission observed, Cable's use of labor is relatively efficient. (*Notice*, footnote 100).

growth of 1% in the output requires a 1% growth rate in input, then the total factor productivity growth rate would be zero. In this example, if the Commission were to incorrectly assume that the operator should have, for example, 2% productivity growth, then the operator would be unfairly penalized in the annual rate adjustment because of the unique circumstances that cause inputs to increase as it gains new subscribers. In the next section, we discuss specific circumstances which would clearly describe parts of the country where customers are highly likely to be adversely impacted by the Commission's productivity offset proposal.

It is well known that many industries are subject to economies of density.[5] In such a situation, average cost is critically dependent on the density of the customers. Thus opportunities for cost reduction (and hence productivity gains) are much less available in sparse population areas. For example, in the airline industry, a large scale study concluded "The primary factor explaining cost differences is density of traffic within an airline's network."[6] With the productivity offset proposal, the Commission assumes that cable operators in all areas of the country have equivalent opportunities for productivity gains. The Commission's assumption is obviously false. In fact, the Commission's own benchmark database shows that in some areas, a gain of 100 customers could be achieved with 1 mile of cable; in other areas, a gain or 100 customers would require as much as 9 miles of cable. We refer to the database of 377 cable systems which it used in Appendix E of the Commission's *Report and Order*, MM Docket No. 92-266, released May 3, 1993. Miles per 100 Subscribers is defined as 100 times S2_MILES divided by S2_HHSUB using the Commission's variable names.

Since the areas which require 9 miles of cable per 100 subscribers would have high capital growth relative to the output gain, it would have little or no productivity gain. Thus the consumers in such areas would be penalized because the cable operators could not expand economically because of the 'productivity offset' rules and regulations implemented by the Commission.

In the cable industry penetration -- the number of cable subscribers as a percent of homes passed -- plays a large role in shaping the economies (and hence productivity) available to a given cable operator. In an area with high penetration, as defined here, it would be more difficult to gain additional subscribers. The only way to gain additional subscribers would be to build additional cable plant, if even that option is available to the operator. Thus the operator is, as in the previous section, faced with the possibility of having to increase the inputs (the capital, labor, and materials) to gain additional output (subscribers). Given the

---

5. F. M. Scherer and D. Ross, *Industrial Market Structure and Economic Performance*, Third Edition, Boston, Mass.: Houghton Mifflin Company, 1990., chapter 4.

6. D. Caves, L. Christensen, and M. Tretheway, "Economies of Density Versus Economies of Scale: Why Trunk and Local Service Airline Costs Differ," *Rand Journal of Economics*, Vol. 15, No. 4, Winter 1984.

definition of total factor productivity as the output growth rate minus the input growth rate, operators with already high penetration would expect essentially zero percent productivity. Thus, even a modest productivity offset would discourage cable infrastructure investment in such areas.

One should not conclude that several productivity offsets could solve the problem that is raised here; the data above shows that a whole range of values would have to be adopted by size of cable operator and population density. Furthermore, the personal income growth in the operator's state would also be a factor; increasing personal income would likely make it easier to acquire additional subscribers. Thus, if the Commission were to try to adopt different productivity offsets to account for the unique circumstances of cable operators throughout the country, it would have to produce an entire 'benchmark-like' table of values to accurately represent potential productivity gains. It would also have to adjust GNP-PI to reflect regional and local differences. This is clearly impracticle.

In any event, accurate and reliable data to calculate a cable industry productivity growth rate is not available to the Commission. The correct approach to productivity measurement in the cable industry requires investigation of the total factor productivity concept. This is calculated as the output growth rate minus the input growth rate. This requires historical measures of inputs such as labor, materials, and the capital stock as well as a measure of the products and services that the industry sells to the public.[7]

Careful attention to data details is required and a realistic assessment of capitalized labor should be separated from 'expensed' labor. The modern approach to measurement of the capital stock is well-accepted among economists[8]; it requires inflation adjusted values for past investment by asset category by year including economically correct depreciation rates, corporate tax rates, as well as an overall correct industry rate of return. It should also account for asset appreciation and the tax effects of both depreciation and investment tax credits.[9] A calculation for the cable industry would have to identify, separately, different sources of economies, and differentiate one-time effects from those that could be expected to continue in the future. A productivity offset would have to account for the vast differences

---

7. See the exhaustive study of some 60 industries in D. Jorgenson, F. Gollop, and B. Fraumeni, *Productivity and U.S. Economic Growth*, Cambridge, Mass.: Harvard University Press, 1987.

8. See, for example, the references in footnotes 3 and 4 above.

9. The modern economic approach to measurement of the capital stock shows the irrelevance of the Commission's unsupported reliance on Tobin's Q as a measure of market power. (See, for example, fn. 44 of the Commission's July 16 Notice.) Furthermore, the modern approach specifically acknowledges the existence and value of intangibles in the capital stock. See, for example, B. Hall, "Stock Market's Valuation of R&D Investment During the 1980's", *American Economic Review*, Vol 83, No. 2, (May, 1993) p. 259 as well as L. Weiss, "Advertising, Profits, and Corporate Taxes", *Review of Economics and Statistics*, November, 1969, p. 421.

in realizable productivity improvements in specific cable systems (to say nothing of individual franchises) due to the "lumpiness" of capital additions.

Moreover, past applications of a productivity offset program by the Commission in telecommunications provide no guidance or support for such a program applied to the cable industry. The Local Exchange Carrier (LEC) price caps program does use a productivity offset in its annual rate adjustment program for *interstate* telecommunications services. This initial price caps plan for these telecommunications carriers was premised on the assumption that some productivity offset could be broadly defined so as to apply to all of the large, or "Tier I" carriers. This assumption was not, of course, subjected to testing, because the Commission lacked the necessary carrier-specific data to do so. More recent evidence suggests that there is no single productivity offset that is applicable to all carriers in the industry. Since the overall economics of the cable industry (as partially described above) reveals that there is even more disparity than for telecommunications carriers. Thus a single productivity offset (or even several) would be totally arbitrary.

The current system of "price caps" now applied to telephone companies was developed by the FCC from several assumptions or factors. The Commission had multiple years of administering a cost of service based program of rate regulation for telephone companies. Substantial amounts of historical, time series data had been developed prior to the implementation of price caps, and telephone company price index data comparable to broader measures of national price changes had been collected for well over 40 years. The FCC assumed that a single value for annual productivity changes could be developed for at least the largest telephone holding companies. The price cap based on national average price index adjustments could be modified as needed by a limited set of "exogenous" adjustments, and the resulting product categorized according to well-defined service baskets and bands. In noting its ability to rely upon the large existing, historical data base of telephone company information, the Commission was reiterating its findings through the Price Caps proceeding.[10] The Commission also predicated the national average price caps plan on many of the uniform rules that it had developed under Title II regulation.[11]

---

10. *See*, for example, the *Further Notice of Proposed Rulemaking*, 3 FCC Rcd at 3195 at paragraphs 118, 130-131 (1988). The FCC also noted, "In the LEC Price Cap Order, we found that the rates in effect on July 1, 1990, as adjusted by subsequent errata, represented a reasonable basis from which to begin price cap regulation. Those rates were the product of an annual access review process, and represented the latest set of rates shaped by an ongoing rate of return review process dating back to 1984." *Order on Reconsideration*, 6 FCC Rcd 2637 at paragraph 152 (1991), footnote omitted.

11. "In the area of LEC costs, jurisdictional separations, usage, and earnings data, we currently monitor LEC performance using two reporting systems...Based on our review of these reports and their contribution to price cap regulation, we conclude that these reports will adequately provide the information we will need to monitor price cap LECs." *LEC Price Cap Order* (CC Docket No. 87-313) 5 FCC Rcd 6786 at paragraph 373 (1990).

However, despite all of this data collected over a period of many years under a uniform system of accounts, the Commission never successfully measured Total Factor Productivity in the LEC industry. In its LEC telecommunications price caps docket, the Commission used telecommunications prices relative to inflation to measure productivity.[12] The primary weight was placed on 5 or 6 annual price values which had no relationship to a standard economic total factor productivity study.

Thus, a close and careful examination of the details of the LEC price caps program and the development of its productivity offset shows clearly that past applications of a productivity offset program by the Commission in telecommunications provide no guidance or support for such a program applied to the cable industry.

Finally, although a complete analysis of total factor productivity is not possible due to data limitations as discussed above, a rough calculation of 'labor productivity' can be made at the aggregate industry level. Cable industry data for the 1981 through 1991 time period[13] show that output (number of subscribers) grew from 23.2-million to somewhat less that 55.8-million, a growth rate of 10.5% per year. However, the growth rate of labor is 10.5% per year for the same time period, based on a change in employees from 45,351 to 106,771; therefore labor productivity (calculated as output minus labor) is zero percent per year for the last eleven years.[14] In any case, a rough calculation of labor productivity is a poor substitute for total factor productivity given the wide variation of system characteristics found in the cable television industry.

---

12. *Second Report and Order*, FCC CC Docket No. 87-313, Released October 4, 1990, Appendices C (Frentrup and Uretsky) and D (Spavins and Lande).

13. "Cable Television Developments", NCTA, October, 1992

14. Since the capital input growth rate is probably the same or higher, this calculation implies that a full TFP growth rate is similar to the results we show here.

Exhibit G

RATE OF RETURN RECOMMENDATIONS

IN CABLE TELEVISION COST-OF-SERVICE REGULATION

Prepared by

A. Lawrence Kolbe
Lynda S. Borucki

The Brattle Group
50 Church Street
Cambridge, Massachusetts 02138
(617) 864-7900

July 1994

TABLE OF CONTENTS

I. INTRODUCTION AND SUMMARY 1

A. BACKGROUND 1

B. THE DIFFICULTIES FACING THE COMMISSION 2

C. RELIANCE ON RISK POSITIONING METHODOLOGIES IS APPROPRIATE HERE . . 3

D. SUMMARY OF ANALYSIS AND RESULTS 5

II. RATE OF RETURN PRINCIPLES RELEVANT TO THE CABLE INDUSTRY 8

A. ESTIMATION OF THE COST OF CAPITAL 9

1. THE DISCOUNTED CASH FLOW (DCF) METHODOLOGY 11

A. THE BASIC DCF FORMULA 11

B. DIFFICULTIES IN APPLICATION OF DCF TO THE CABLE INDUSTRY 12

2. RISK PREMIUM OR RISK POSITIONING METHODS 13

B. SPECIAL PROBLEMS IN SETTING A REGULATED COST OF CAPITAL IN CABLE TELEVISION. 17

C. EFFECT OF DEBT ON THE OVERALL COST OF CAPITAL 18

III. RISKS THAT CABLE TELEVISION COMPANIES FACE 22

A. GENERAL DESCRIPTION OF THE FACTORS THAT CONTRIBUTE TO RISK . 22

B. DESCRIPTION OF FACTORS WHICH CONTRIBUTE TO THE RISK OF CABLE TELEVISION COMPANIES 23

C. REGULATED CABLE SERVICE IS RISKIER THAN REGULATED TELEPHONE SERVICE 24

IV. RESULTS 26

A. S&P 400 INDUSTRIALS 26

1. METHODOLOGY 26

2. COST OF EQUITY ESTIMATES OBTAINED FROM RISK POSITIONING ESTIMATES ARE COMPARABLE TO DCF COST OF EQUITY ESTIMATES 28

3. THE COST OF EQUITY FOR NON-DIVIDEND PAYING COMPANIES IN THE S&P 400 IS HIGHER THAN THE AVERAGE COST OF EQUITY FOR DIVIDEND PAYING COMPANIES IN THE S&P 400 30

4. HIGH FINANCIAL LEVERAGE IS NOT NECESSARILY INDICATIVE OF LOW BUSINESS RISK 34

B. THE SAMPLE OF "PURE PLAY" CABLE COMPANIES 37

1. THE SAMPLE 37

2. THE COMMISSION'S CONCERNS ABOUT THE USE OF CABLE EQUITY BETAS TURN OUT TO BE UNWARRANTED 38

A. CONCERN ABOUT CABLE BETAS BASED ON CLOSELY HELD NATURE OF CABLE STOCKS 39

B. CONCERNS ABOUT CABLE BETAS BASED ON A VIEW THAT CABLE COMPANIES HAVE HISTORICALLY HAD MONOPOLY POWER 47

C. THE CABLE EQUITY BETAS MEASURED TODAY ARE LIKELY TO BE CONSERVATIVE ESTIMATES OF THE TRUE BETAS .. 47

3. CABLE COMPANY COST OF CAPITAL ESTIMATES 50

C. TELECOMMUNICATION COMPANIES 52

V. CONCLUSIONS 53

APPENDIX A: QUALIFICATIONS OF A. LAWRENCE KOLBE

APPENDIX B: EMPIRICAL PROCEDURES

RATE OF RETURN RECOMMENDATIONS IN CABLE TELEVISION COST-OF-SERVICE REGULATION

I. INTRODUCTION AND SUMMARY

A. Background

In its March 30, 1994, Cost-of-Service Order,[1] the Commission established an interim overall return of 11.25 percent for use in cable company cost-of-service showings.[2] The Commission emphasized the interim nature of the figure, however, and sought additional information regarding what reasonable overall return figure to use in its permanent cost-of-service rules for cable.[3]

The Brattle Group was asked to respond to the Commission's request for additional information on this topic by Continental Cablevision, a member of a group of cable operators and associations jointly filing comments in response to this and other issues raised by the Commission's March 30 Order. This report was prepared by A. Lawrence Kolbe, assisted by Lynda S. Borucki. Dr. Kolbe holds a Ph.D. in Economics from the Massachusetts Institute of Technology and a B.S. in International Affairs (Economics) from the U.S. Air Force Academy. Dr. Kolbe has over 15 years of experience with cost-of-service regulation, much of it focused on rate of return issues.[4] Dr. Borucki has worked on the cost of capital and related

---

[1] In the matter of Implementation of Sections of the Cable Television Consumer Protection and Competition Act of 1992, *Report and Order and Further Notice of Proposed Rulemaking*, MM Docket 93-215, FCC 04-39, released March 30, 1994, (Cost-of-Service Order).

[2] Cost-of-Service Order at ¶ 147.

[3] The analyses in this report assume that, in recognition of the fact that the cost of capital changes over time, the Commission will revisit the question of an appropriate overall cost of capital for cable companies approximately every two years. If the Commission plans to revisit the issue less frequently than that, some of our cost of capital estimates are too low.

[4] Appendix A contains more details on Dr. Kolbe's qualifications.

issues with Dr. Kolbe and with Professor Stewart C. Myers of MIT (also a member of The Brattle Group) in a number of previous matters. Dr. Borucki holds a Ph.D. in Managerial Economics and Decision Sciences from the Kellogg Graduate School of Management, Northwestern University.

B. The Difficulties Facing The Commission

The Commission's effort to estimate an industry-wide cost of capital for the cable industry has been complicated by three facts. First, there are relatively few publicly traded companies that are primarily in the business of providing cable television services, and this group represents a much smaller fraction of the industry as a whole than the fraction of the telephone industry represented by large, publicly traded telephone companies. Second, only two of the eight companies that derive the bulk of their revenues from cable television service pay regular dividends. Finally, many cable companies — including some of those that are publicly traded and hundreds of those that are not — are very highly leveraged on both a "book" and "market" basis, and a significant number even have *negative* net worth. In these circumstances — and unlike the situation with telephone companies — it is essentially impossible to apply the Commission's preferred method for estimating the cost of equity, the Discounted Cash Flow (DCF) method, to derive a reasonable estimate of the rate of return for cable television service.

In establishing the 11.25 percent interim cost of capital, the Commission did not so much resolve this conundrum as temporarily set it aside. Specifically, the Commission determined that a reasonable cost of long-term debt for cable companies was 8.5 percent; tentatively accepted a range of 40 percent to 70 percent as plausible debt ratios; tentatively concluded that the cost of equity for cable companies would fall into the 12 percent to 15 percent range; calculated the resulting mix of possible weighted costs of capital; averaged those figures for each hypothetical debt ratio; and then selected a figure from within the range of

averages.[5] While determining an industry's cost of capital is never an exact science, this process is clearly much less precise than would be preferable, and, indeed, much less precise than the process the Commission itself uses when setting an allowed reasonable rate of return for telephone companies.[6]

C. Reliance on Risk Positioning Methodologies is Appropriate Here

We recognize the Commission's greater familiarity with the DCF approach to estimation of the cost of equity. Nonetheless, the circumstances of the cable industry, summarized above, make the DCF method essentially unusable. As a result, the Commission must rely on another approach to estimating the industry's cost of equity.

The most significant problem with applying the DCF methodology is that the vast majority of cable companies, including most of those that are publicly traded, pay no dividends. At a minimum, the lack of a regular dividend stream, and a corresponding lack of reliable analysts' estimates of projected dividend growth, represents a significant technical obstacle to applying the DCF approach. This alone should give the Commission pause. Moreover, this situation is very different from the one the Commission faces in the telephone industry. There, while the operating entities themselves frequently have no publicly traded stock, and, therefore, no analysts' forecasts of dividend growth, those entities are owned by firms whose primary business is telecommunications and who do pay dividends. In those circumstances, unlike the situation here, it is a relatively small stretch to rely on cost of equity estimates for the parent companies in setting an overall allowed return for the operating entities.

---

[5] Cost-of-Service Order at ¶¶ 147-208.

[6] See *Represcribing the Authorized Return for Interstate Services of Local Exchange Carriers*, 5 FCC RCD 7507 (1990).

The problem here, however, is much more fundamental than a technical glitch in the DCF model. Companies that do not pay dividends rely on growth in stock value alone to reward their investors. Such companies tend to be fundamentally different from those with a history of paying (and an expected future ability to continue to pay) a current and regularly increasing dividend.

In practice, there are two main reasons for a publicly traded company not to pay dividends: (a) the company's expected cash flows may be too uncertain to support a regular dividend, or (b) the company may need the cash internally. The latter reason has two flavors of its own: (b1) the company may be in severe financial distress, or (b2) the company may have growth opportunities that it wants to exploit with all available resources. Given these explanations, *a priori*, one would expect non-dividend companies to be riskier than dividend-paying companies. While exceptions are possible, companies whose prospects are uncertain or who need to conserve cash will be riskier than average almost by definition.

We discuss below the significance of the fact that cable companies often do not pay dividends. At the outset, however, the Commission must confront and accept the fact that typical DCF models cannot reasonably be used to estimate the cost of equity of an industry that generally does not pay dividends. Indeed, not only can the DCF method not be applied to cable firms directly, it cannot be applied to *any* firm that is "like" cable firms in the crucial respect of basing its long-term business success, and its access to capital, entirely on its ability to increase its asset value over the long-term. Any surrogate group comprised of firms which do pay regular dividends, for which the Commission therefore *can* estimate a DCF cost of equity, will tend to be of lower risk than cable companies.

In these circumstances, a sensible alternative is to find a method for estimating the cost of equity that does not automatically exclude firms that do not pay dividends. Fortunately, the various "risk positioning" or "risk premium" models, such as the

Capital Asset Pricing Model (CAPM) and its empirical versions, provide such methods. Without debating the theoretical advantages or disadvantages of risk positioning versus DCF in the abstract, it is clear that the CAPM, for example, is a theoretically sound, well-researched, empirically reasonable method for estimating the cost of equity. And it does not, *a priori*, exclude the cable firms at issue in this proceeding and all firms that are "like" them in the crucial respect of dividend payment.

D. Summary of Analysis and Results

Our analysis proceeded along the following lines. First, to provide assurance to the Commission that there are no systematic biases in applying the CAPM, we calculated the DCF cost of equity for the portion of the Standard & Poor's 400 Industrials (S&P 400) to which that method can be applied — that is, those firms in the S&P 400 that pay dividends.[7] We then calculated the CAPM cost of equity for those same firms. While there was a certain degree of variation, which is to be expected, the two approaches produced very similar estimates of the cost of equity of this broad sample of the market.[8] This evidence gives the Commission substantial assurance that the CAPM does not produce results that are out of line with the DCF approach.

Second, we examined the hypothesis that firms that do not pay dividends are, generally, riskier than firms that do. We determined the CAPM cost of equity for the firms in the S&P 400 that do not pay dividends and compared the results to the CAPM cost of equity for the firms in the S&P 400 that do pay dividends. The evidence confirms the hypothesis: the dividend paying group had an average cost

---

[7] In addition to the standard DCF model, which assumes a constant growth rate for every period, we examined alternative DCF formulas which take into account the difference between near-term and longer-term growth expectations.

[8] In fact, the CAPM estimates of the cost of equity are generally slightly lower than the DCF estimates.

of equity of about two percentage points *lower* than the non-dividend paying group. Moreover, the average cost of equity for the non-dividend paying firms is consistent with the cost of equity estimates for the upper quartile of the S&P 400.

Third, we determined the all-equity cost of capital[9] of a group of eight firms that are as close to "pure play" cable companies as we could find.[10] We reviewed the concerns the Commission raised about use of these companies, and we found that when appropriate adjustments were made (*e.g.*, for differences in debt ratios), the concerns turned out to be unwarranted. These companies *can* provide reliable information on the cost of capital for the cable television industry.

Analysis of these companies demonstrates that the all-equity cost of capital for the cable companies is *at least* 13.0 percent. To the extent that the Commission is still interested in positioning the cable industry relative to the S&P 400, this turns out to be near the middle of the third quartile of the dividend paying companies of the S&P 400, on an overall cost of capital basis.[11] It is also consistent with our observation that non-dividend paying companies have all-equity costs of capital that fall between the third and fourth quartiles of the dividend paying companies of the S&P 400. This provides substantial confirmation that cable companies are significantly riskier than the market as a whole. It also provides a reasonable basis for establishing a cost of equity for use in cable industry cost-of-service cases. Indeed, other factors, such as the fact that most cable companies do not have publicly traded stock, are highly leveraged, and are moving into an environment of

---

[9] The "all-equity" cost of capital eliminates any differences in risk due to leverage. The all-equity cost of capital is the cost of capital the company would have with no debt at all; that is, it might also be called the "no-debt cost of equity."

[10] From one perspective, eight is a small number. However, it is not uncommon for commissions to base decisions on even smaller samples when the number of publicly traded pure plays is small.

[11] Because of differences in debt ratios, the cable cost of *equity* at a 50-50 capital structure is in the *fourth* quartile of the cost of equity of S&P dividend paying companies.

increasing risk due to the combination of competition and regulation, suggest that this range is a conservative estimate for the cable industry as a whole.

Fourth, we note that the 11.25 percent interim overall return the Commission established for cable companies is the same as the overall return the Commission has established for telephone companies. For a number of reasons, we would expect regulated cable services to be significantly riskier than regulated telephone services, so the fact that the Commission's interim figure for the cable industry was the same as its figure for the telephone industry must raise concerns about the analysis that produces such a result. To investigate this issue, we calculated the CAPM cost of equity for the seven Regional Bell Holding Companies (RBHCs) and compared it to the previously calculated cost of equity of the eight cable firms. The mean cost of equity of the telephone sample was estimated at 13.0 percent to 13.7 percent at the 50 percent debt hypothetical capital structure, which is 4 to 6 percentage points below the mean cost of equity of the cable sample estimated at the same hypothetical capital structure. The RBHC estimates are also 3 to 4 percentage points below the median all-equity cost of capital of the non-dividend paying segment of the S&P 400 and in the range of all-equity cost of capital estimates for the bottom two quartiles of the S&P 400 dividend paying companies. This demonstrates that the 11.25 percent overall return is far too low for cable companies under current market conditions.

Finally, we note the need to adjust for leverage in the cost of equity estimate if the Commission is going to estimate the cost of equity from a surrogate group. It is possible to calculate directly the correct cost of equity figure to use in connection with different assumed capital structures. The overall after-tax cost of capital is not very sensitive to capital structure, as long as the capital structures fall within a broad range of reasonableness and the cost of equity is adjusted appropriately to reflect any difference in leverage underlying the base cost of equity estimate. Therefore, if the Commission would like to set an overall return based on a range

of hypothetical capital structures, it will find that the overall weighted-average cost of capital, as normally defined in rate regulation,[12] is equivalent to the all-equity cost of capital regardless of capital structure.

We have determined that the all-equity cost of capital for the sample of cable companies is at least 13.0 percent. This is squarely within the range of all-equity or regulatory weighted-average costs of capital for the third quartile of the dividend paying companies in the S&P 400. Thus, the regulatory weighted-average cost of capital for the cable companies is at least 13.0 percent. This is based on a cost of equity of 17.5 percent, a cost of debt of 8.5 percent and a 50 percent debt-to-value capital structure.

The remainder of the report consists of four parts. Section II sets forth the principles that govern selection of the allowed rate of return for a cost-of-service regulated company. Section III discusses the risk environment that cable television companies face. Section IV presents the numerical analyses. This section also presents evidence to resolve the concerns the Commission raised about use of methods other than DCF to estimate the cost of capital. Section V summarizes our conclusions.

II. RATE OF RETURN PRINCIPLES RELEVANT TO THE CABLE INDUSTRY

This section addresses three issues: the general merits of cost of capital estimation methods; special concerns that arise for estimation of the cost of capital for cable television; and the effect of debt on the overall rate of return.[13]

---

[12] That is, the weighted average of the after-tax cost of equity and the pre-tax cost of debt.

[13] Many of the points in this section were raised in our earlier report, "Rate of Return Issues in Cable Television Cost-of-Service Regulation" filed in response to the Commission's *Second Notice of Proposed Rulemaking* in Docket No. 93-215 dated July 15, 1993. However, for completeness and ease of reference, we have chosen to restate them here.

A. Estimation of The Cost of Capital

The cost of capital performs three basic functions. First, it compensates investors for the pure time value of money. If people are to be induced to forego current consumption in favor of investing money with someone, they need to be paid for the delay. At the same time, money that can be invested productively today will produce a more valuable asset tomorrow. Investors want a proportionate share of that value.

Second, the cost of capital compensates for expected inflation. If you put $100 aside today, and if you expect it will only buy $95 worth of today's goods when you get the money back, you need compensation not only for the time value of money, but also for the lost $5 of purchasing power. The cost of capital as usually stated includes such compensation.[14]

Third, the cost of capital compensates for risk. Experience teaches that investors require a higher rate of return when an investment exposes them to risks that are beyond their power to eliminate. The more risk — *e.g.*, the greater the chance the returns the investment actually gives them may differ from the returns they expect — the higher the "risk premium" they demand to supply capital.

The cost of capital is defined as the expected rate of return in capital markets on alternative investments of equivalent risk. Three key points in this definition are:

- Since the cost of capital is an *expected* rate of return, it cannot be directly observed; it must be inferred from available evidence.

---

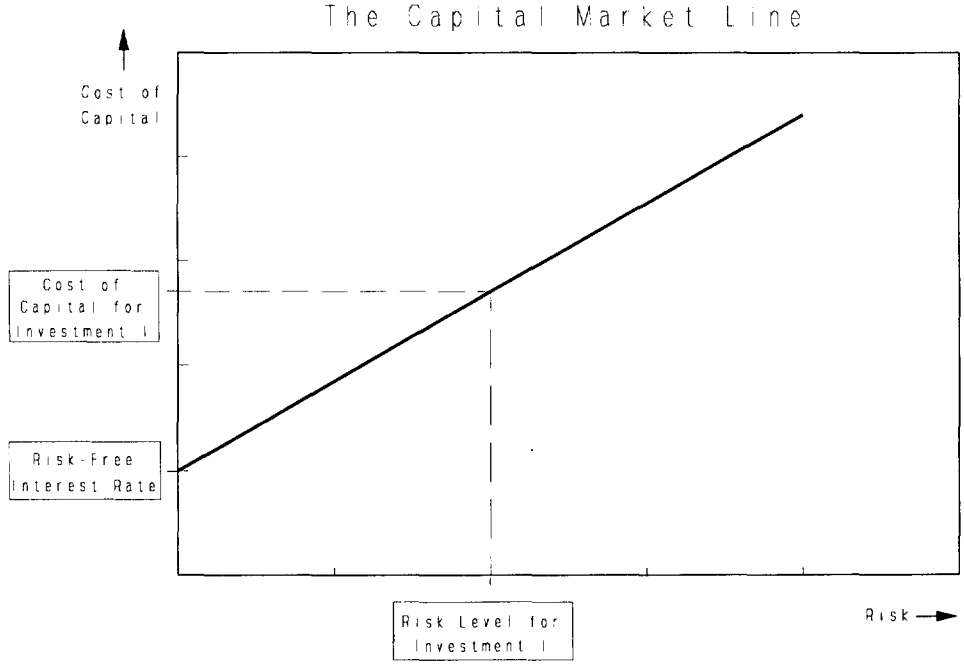
[14] When inflation compensation is included, the cost of capital is known as the "nominal" cost of capital. When it is excluded, the cost of capital is known as the "real" cost of capital. However, inflation compensation is not always received in cash, the way it is with interest on a savings account -- it can also come in the form of expected appreciation in the value of the underlying asset, as with real estate.

- Since the cost of capital is determined *in capital markets* (*e.g.*, the New York Stock Exchange), data from capital markets provide the best evidence from which to infer it.

- Since the cost of capital depends on the return offered by alternative investments *of equivalent risk*, measures of the risks that matter in capital markets are part of the evidence that needs to be examined.

Capital markets act to equilibrate the supply and demand for capital of the varying degrees of risk. The cost of capital is the market-clearing price, expressed as a rate of return on investment, for a given risk level.

Figure 1
The Capital Market Line



The relationship between risk and the cost of capital is summarized by the "capital market risk-return line," or "capital market line" for short. Figure 1 illustrates the capital market line, with risk measured on the horizontal axis and the cost of capital on the vertical axis. The time value of money and the need for an inflation

premium imply the cost of capital is positive even for zero-risk securities (*i.e.*, short-term U.S. Treasury bills). As risk increases, so does the cost of capital. The cost of capital for any particular investment can be read off the vertical axis of the security market line if its risk can be identified on the horizontal axis.

Unfortunately, except for risk-free assets such as Treasury bills, the cost of capital cannot be directly observed. We can observe share price volatility, for example, but not the rate of return investors expect when they buy those shares. The problem, therefore, is how to estimate investors' expected rate of return using information that we can observe, such as current interest rates and various statistically-calculated measures of relative risk, or current share prices, dividend yields, and estimates of future growth expectations. We discuss the two most widely used ways of doing that next.

1. The Discounted Cash Flow (DCF) Methodology

a. The Basic DCF Formula

The most widely-used method by which regulators estimate the cost of capital is the Discounted Cash Flow, or DCF, methodology. The DCF approach relies on a simple formula:

$$r = D_1/P + g$$

where r is the cost of capital; D_1 is the dividend cash flow expected at the end of the next period (*e.g.*, the next quarter or year); P is the market price of the stock; and g is the *dividend* growth rate that investors expect to continue at the same level into the indefinite future.

b. Difficulties in Application of DCF to the Cable Industry

While the formula appears simple, the steady-growth assumption embedded in it is almost always untrue and turns out to matter considerably in practice.[15] We nonetheless recognize that different analysts will have different views about the overall merits of DCF. Here, however, the model fails in a fundamental way: *Most of the publicly traded companies in this industry pay no dividends.*

This failure is particularly troubling for application of DCF to the cable industry, because of the basic approach DCF takes to cost of capital estimation. That is, there are two basic ways to estimate the cost of capital, both of which flow directly from the capital market line in Figure 1. The first starts by estimating the relative risk of the security. It then uses that information to position the security on the horizontal axis, which locates its position on the capital market line. The capital market line represents the risk-return relationship in the market and is derived from information on the whole market, not just the security in question. The cost of capital can then be read off the vertical axis. Risk positioning (or risk premium) models work this way.

The DCF approach tries to go directly to the cost of capital on the vertical axis, by, in effect, untangling all the information on the cost of capital that is embedded in the price of the stock. While it is theoretically true that stock price contains that information, one must make very strong assumptions about the cash flows that underlie the stock price in order to decode the cost of capital information hidden in

---

[15] The simple formula only works if investors literally expect the dividends a firm pays to grow at a constant rate, *forever*. For that to be true, however, everything else about the firm would have to grow at the same rate, too: earnings per share, book value per share, etc. Yet anyone who pages through *The Value Line Investment Survey* can see that this is not even approximately true for most companies. Growth rate forecasts for different financial measures for the same company often vary by several percentage points, and sometimes by a lot more. This and other factors can create serious problems for the DCF approach even for companies with stable dividends.